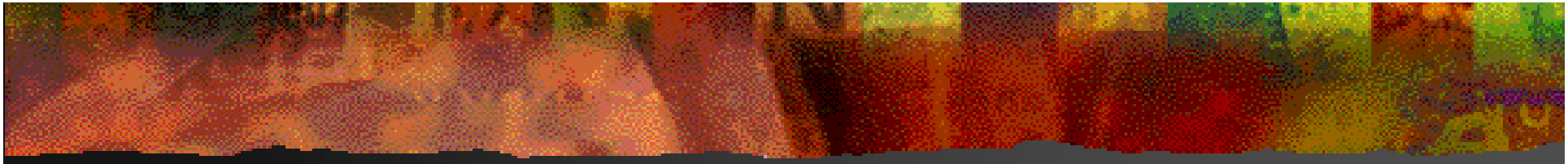

Nutrition and CVD-Related Conditions

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CVD and Atherosclerosis

- CVD accounts for more of the world's deaths each year than any other single cause, mostly by way of heart attacks and strokes.
- Atherosclerosis is hardening of the arteries
  - No one is free from this
  - Begins with soft, fatty streaks along inner walls of arteries which become hardened plaques that damage artery walls
  - Most people have well-developed plaques by the age of 30

What Atherosclerosis leads to…

- Arterial wall weakens and balloons out causing an aneurysm (may burst cause death from bleeding)
- Platelets respond to plaques forming unneeded clots and can enlarge plaques
  - Stationary clot: thrombus, grows large enough to close a vessel: thrombosis
  - Loose clot: embolus, stuck clot: embolism
  - Clot lodged in heart: heart attack; lodged in brain: stroke

How can we decrease risk for atherosclerosis?

- Low-Density Lipoproteins (LDL) oxidize to form free-radical compounds which eventually form hardened plaque
  - **We must lower LDLs!**
- High Density Lipoproteins (HDL) can help "carry away" LDLs
  - **We want a high HDL to LDL ratio!**
- Cholesterol carried in LDL directly correlates with risk of CVD, whereas carried in HDL correlates inversely with risk

Standards for Blood Lipids

(mg/dL)	Low CVD Risk	Borderline	Elevated CVD Risk
Total Blood Cholesterol	**< 200**	**200-239**	**≥ 240**
LDL Cholesterol	**< 100***	**130-159**	**160-189****
HDL Cholesterol	**≥ 60**	**59-40**	**<40**
Triglycerides	**< 150**	**150-199**	**200-499****

* 100-129 mg/dL indicates near or above optimal level

** any number above this value is considered very high risk

Diet and Cholesterol

- Diet high in saturated fat and trans-fatty acids contributes to high blood LDL cholesterol
- Reducing those dietary fats lowers LDLs and may reduce CVD
- “Atherogenic Diet” – high in saturated fats and low in vegetables, fruits, and whole grains

AHA Goals for Dietary Intake and CVD

- Consume a variety of fruits and vegetables and grain products
- Include fat-free and low-fat dairy products, fish, legumes, poultry, and lean meats
- Limit intake of foods with high content of saturated fatty acids and trans-fatty acids (< 10% of total calories) and cholesterol (< 300 mg per day)
- Substitute with unsaturated fats (both long-chain omega-3 polyunsaturated and monounsaturated fatty acids) from vegetables, fish, and nuts

Total fat vs. type of fat intake

- Mediterranean diet – high in total fat but also rich in fish, fruits, and vegetables and fat is monosaturated - low CVD incidence
- American diet mostly meats and hydrogenated fat – if total fat is reduced, saturated fat and their trans-fatty acids will also reduce

Hypertension (HTN)

- Most prevalent form of (risk factor for) CVD, affecting 25% of entire US population
- Systolic Blood Pressure – ventricular contraction
- Diastolic Blood Pressure – ventricular relaxation

BP Classification	SBP	DBP	Lifestyle Modification
Normal	<120	and <80	Encourage
Prehypertension	120–139	or 80–89	Yes
Stage 1	140–159	or 90–99	Yes
Stage 2	≥160	or ≥100	Yes

JNC VII Classification of Blood Pressure for Adults

JNC VII Recommendations

- Major lifestyle modifications shown to lower BP include…
  - Weight reduction in those individuals who are overweight or obese
  - Adoption of the Dietary Approaches to Stop Hypertension (DASH) eating plan
  - Moderation of alcohol consumption
- A 1,600 mg sodium DASH eating plan has effects similar to single drug therapy

DASH DIET

Dietary Approaches to Stop Hypertension (DASH) recommends…

- 7-8 servings/day of grains
- 4-5 servings/day of fruit and vegetables
- 2-3 servings/day of non-fat or low-fat milk
- 2 or less servings/day of lean meat
- 4-5 servings/week of nuts, seeds, and dry beans
- 2000 calories/day

Salt and HTN

- Benefit from reduction of salt intake in **treatment** of HTN is not questioned
  - For 50% of people with HTN, lower salt intake leads to a reduction in BP
- Benefit from salt reduction for **prevention** of HTN has mixed evidence
  - Recommendation: everyone should moderately restrict intake to follow Dietary Guidelines: no more than 2400 mg/day

HTN and nutrients

- Calcium has been found to reduce BP in different populations
- High potassium diets are often associated with hypertension
- Magnesium deficiency causes walls of arterial constriction, raising BP
- Vitamin C seems to help normalize BP

Dietary Factors Protecting Against CVD

- Soluble fiber (apples & other fruit, oats, soy, barley, legumes)
  - Lowers blood cholesterol, risk of heart attack, improves LDL-HDL ratio
- Omega-3 fatty acids (fish oils)
  - Limit clot formation, prevent irregular heartbeats, lower risk of heart attack
- Alcohol in moderation
  - Raises HDL, prevents clot formation

Dietary Factors Protecting Against CVD

- Folate, vitamins B_6, B_{12}
  - Reduce homocysteine (amino acid with elevated levels associated with increased risk of CVD)
- Vitamin E (vegetable oils and margarines, nuts, wheat germ)
  - Slows progression of plaque formation, lowers risk of heart attack in those with CVD, limits LDL oxidation
- Soy (protein and isoflavones)
  - Lowers blood cholesterol, raises HDL cholesterol, improves LDL to HDL ratio

Resources

- American Heart Association
- National Heart, Blood and Lung Association
- National Cholesterol Education Program
- Joint National Committee on Blood Pressure (JNC VII)